SANYO

FILE No.

SERVICE MANUAL

Massage chair

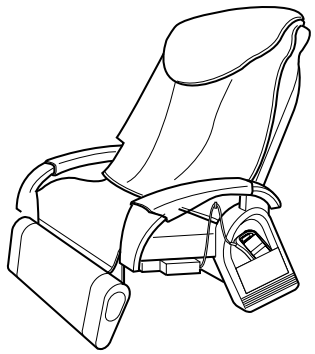
HEC-DR21 (TAIWAN)

MODEL	HEC-DR21
Power source	AC 110 V 60Hz
Power consumption	165 W
Rated time	30 minutes
Personal sensor course	Recovery / Relax
Automatic course	Four (neck / shoulders, upper torso, lower back, legs)
Kneading rate	Approx. 16,22,30 pulses/min. (3 speeds)
Tap rate	Approx. 300,480,600 times/min. (3 positions)
Tap range	Approx. 70,100,130mm (3 positions)
Back stretch settings	Approx. 70,100,130mm (3 positions)
Vertical motion rate	Approx. 30sec./up-and-down cycle
Massage sphere vertical reach	Approx. 635mm (straight line)
Reclining angle	Back: approx. 120-170 degrees, Leg: approx. 0-100 degrees
Leg massage	Rotating roller (Manual course: approx. 15 min., Automatic course: approx. 12 min.)
Roller rotation	Higher speed: 100 times/min., Lower speed: 70 times/min.
Timer	Approx. 13 min. (Automatic Sensor course) Approx. 12 min. (Automatic course) Approx. 15 min. (Manual course)
Dimensions (W x D x H)	Approx. 670 x 1,000 x 1,050 mm (When footrest is stored) Approx. 670 x 1,550 x 550 mm (When footrest is in horizontal position) Approx. 670 x 1,700 x 550 mm (When footrest is fully opened)
Weight	Approx. 55 kg

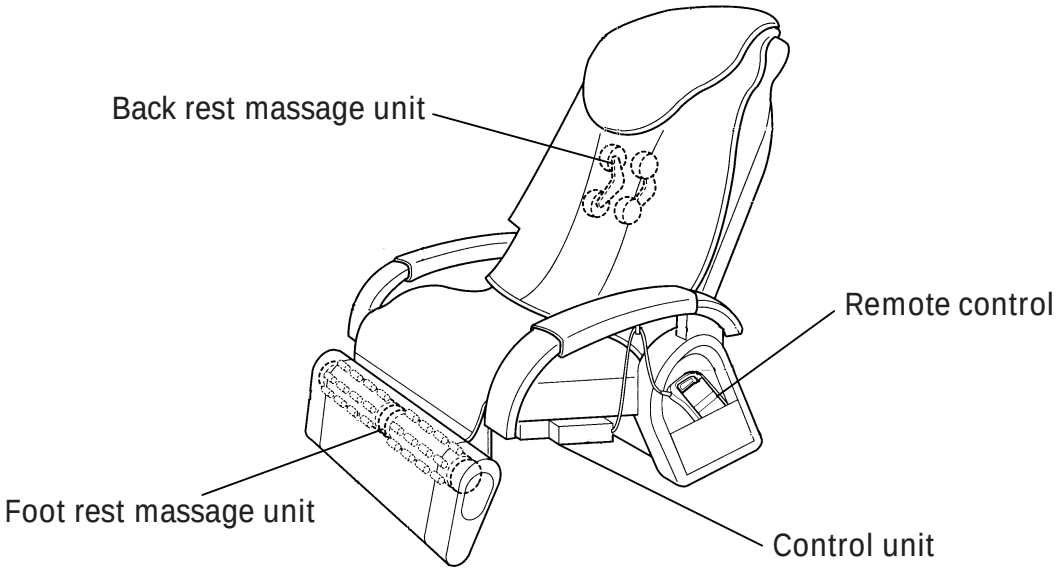
PRODUCT CODE NO.

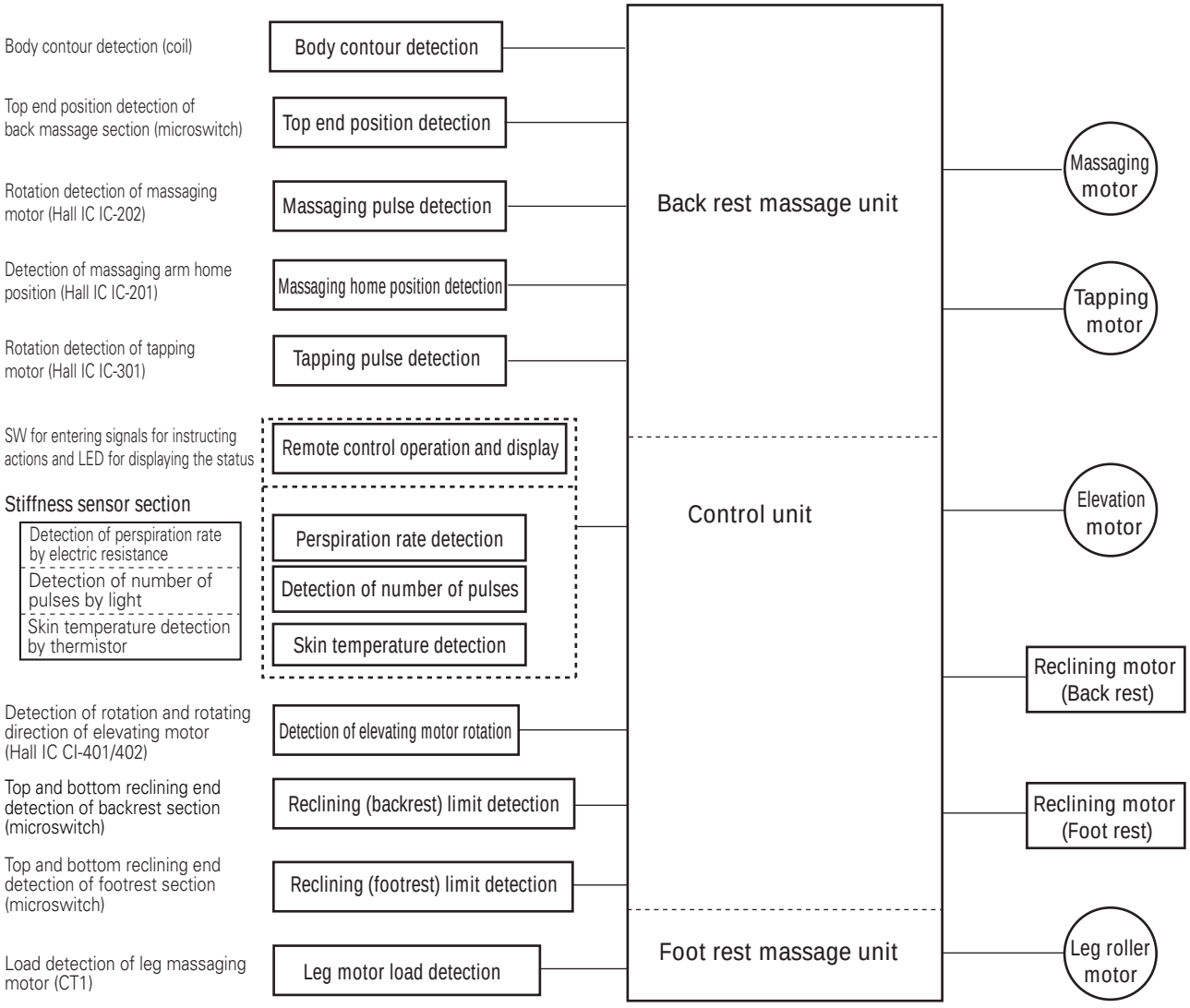
1 - 383 206 51 (K)

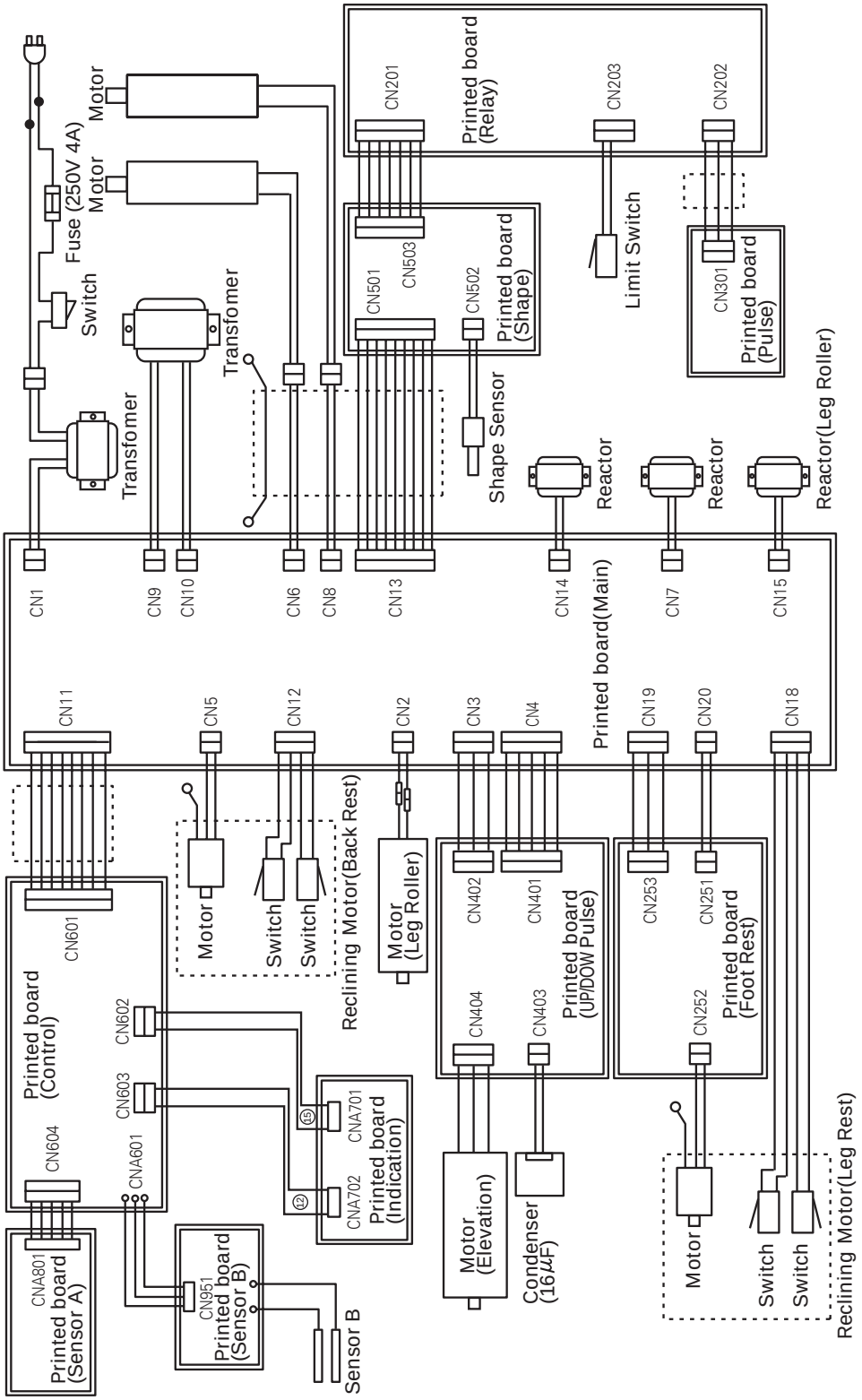
1 - 383 206 52 (H)

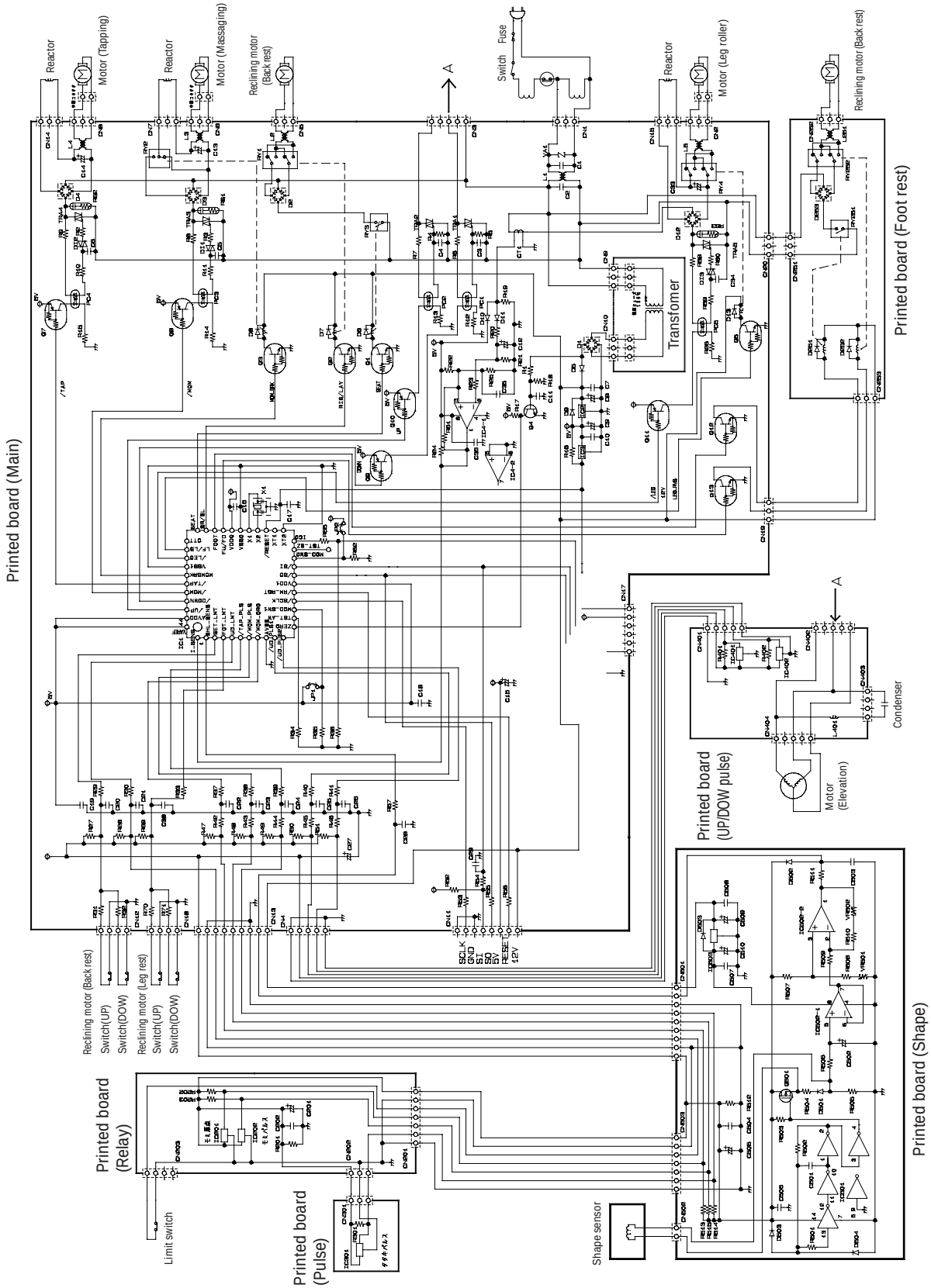


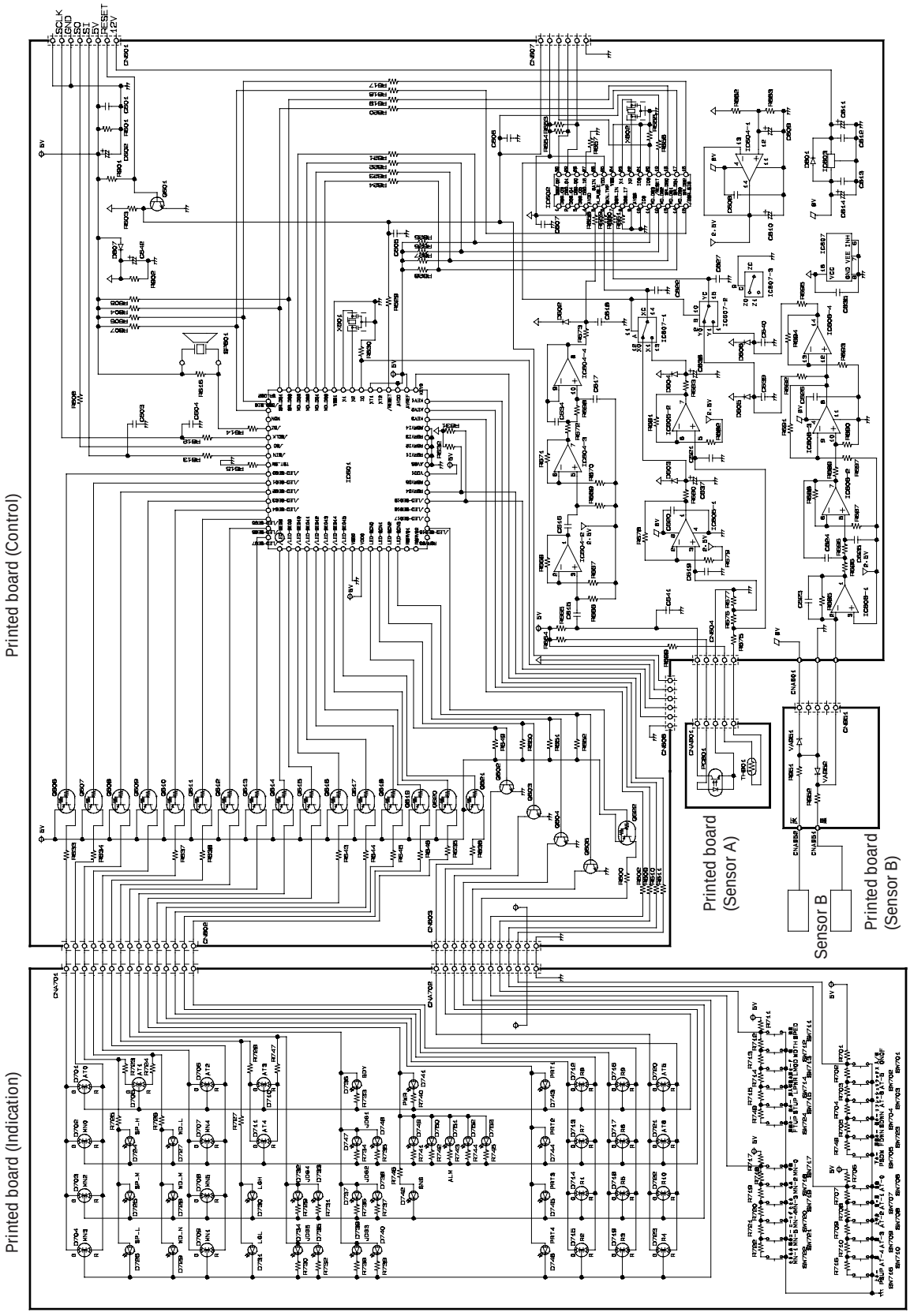
REFERENCE NO. SM6510406-00


Back rest massage unit
Remote control
Foot rest massage unit
Control unit

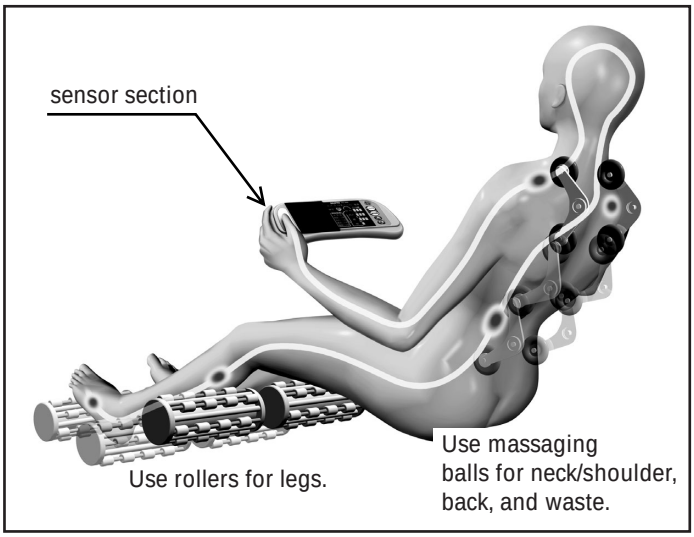

Body contour detection (coil)
Body contour detection
Top end position detection of back massage section (microswitch)
Top end position detection
Rotation detection of massaging motor (Hall IC IC-202)
Massaging pulse detection
Detection of massaging arm home position (Hall IC IC-201)
Massaging home position detection
Rotation detection of tapping motor (Hall IC IC-301)
Tapping pulse detection
SW for entering signals for instructing actions and LED for displaying the status
Remote control operation and display
Stiffness sensor section
Detection of perspiration rate by electric resistance
Detection of number of pulses by light
Skin temperature detection by thermistor
Perspiration rate detection
Detection of number of pulses
Skin temperature detection
Detection of rotation and rotating direction of elevating motor (Hall IC CI-401/402)
Detection of elevating motor rotation
Top and bottom reclining end detection of backrest section (microswitch)
Reclining (backrest) limit detection
Top and bottom reclining end detection of footrest section (microswitch)
Reclining (footrest) limit detection
Load detection of leg massaging motor (CT1)
Leg motor load detection
Back rest massage unit
Control unit
Foot rest massage unit
Massaging motor
Tapping motor
Elevation motor
Reclining motor (Back rest)
Reclining motor (Foot rest)
Leg roller motor

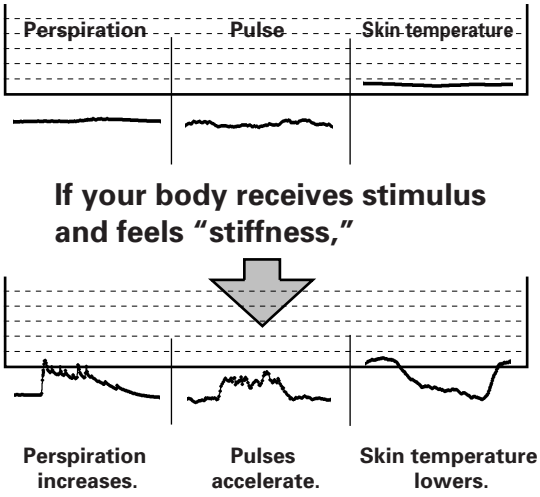

Printed board (Relay)
CN201
CN203
CN202
Limit Switch
Printed board (Pulse)
CN301
Printed board (Shape)
CN501
CN503
CN502
Shape Sensor
Motor
Fuse (250V 4A)
Motor
Switch
Transfomer
Transfomer
Reactor
Reactor
Reactor(Leg Roller)
CN1
CN9
CN10
CN6
CN8
CN13
CN14
CN7
CN15
Printed board(Main)
CN11
CN5
CN12
CN2
CN3
CN4
CN19
CN20
CN18
Motor
Switch
Switch
Reclining Motor(Back Rest)
Motor (Leg Roller)
CN402
CN401
Printed board (UP/DOW Pulse)
CN253
CN251
Printed board (Foot Rest)
CN404
CN403
CN252
Printed board (Control)
CN601
CN602
CN603
CN604
CNA601
CNA701
CNA702
Printed board (Indication)
Motor (Elevation)
Condenser (16μF)
Motor
Switch
Switch
Reclining Motor(Leg Rest)
CNA801
Printed board (Sensor A)
CN951
Printed board (Sensor B)
Sensor B


Printed board (Main)
Printed board (Foot rest)
Printed board (Shape)
Printed board (UP/DOW pulse)
Printed board (Relay)
Printed board (Pulse)
Transformer
Reactor
Motor (Tapping)
Motor (Massaging)
Reclining motor (Back rest)
Switch
Fuse
Motor (Leg roller)
Condenser
Motor (Elevation)
Limit switch
Shape sensor
Reclining motor (Back rest)
Switch(UP)
Switch(DOW)
Reclining motor (Leg rest)
Switch(UP)
Switch(DOW)
SCLK
GND
SI
SO
5V
HESE
12V


Printed board (Control)
Printed board (Indication)
Printed board (Sensor A)
Printed board (Sensor B)
Sensor B

To the remote controller sensor section, three kinds of sensors (skin electric resistance, photo sensor, thermistor) are assembled, and measure three kinds of physiological amounts (perspiration, pulse, skin temperature).
When stiff portions are subject to massage stimulus of detection massage, changes are observed in the perspiration rate, number of pulses, and skin temperature.
These three kinds of displacements are measured.





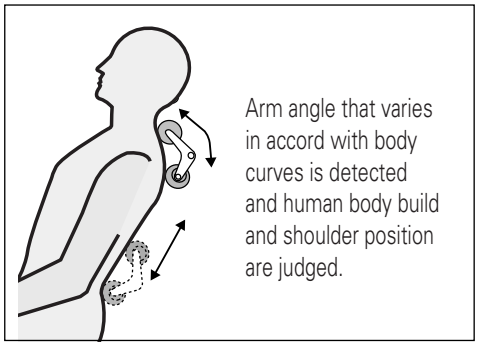
Stiffness feeling is judged by combinations of perspiration rate, number of pulses, and skin temperature and are classified into four stages (relax, normal, stiffness feeling, pains).

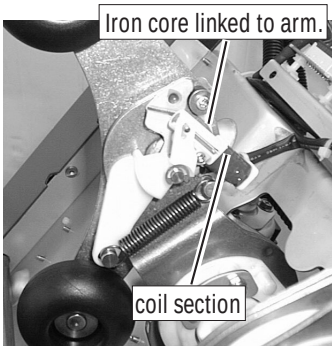
1. In the case of relax, perspiration rate tends to lower.
2. In the case of normal, change of each physiological amount is small.
3. In the case of stiffness feeling, perspiration rate and number of pulses tend to increase.
4. In the case of pains, perspiration rate greatly increases and number of pulses tends to increase.

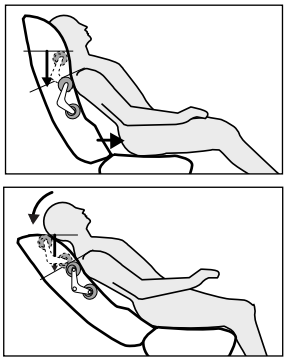
Stiffness feeling is indicated by three colors: green (relax), orange (normal), red (stiffness feeling/pains).

Operation of Body Contour Sensor

The body contour sensor judges the body contour (shoulder position) by changes of angles of massage arms.
Sensors consist of coils and iron cores, detect displacement of reactance, and convert into angular changes.







Even if body position is deviated during massage, the shoulder position is automatically corrected.

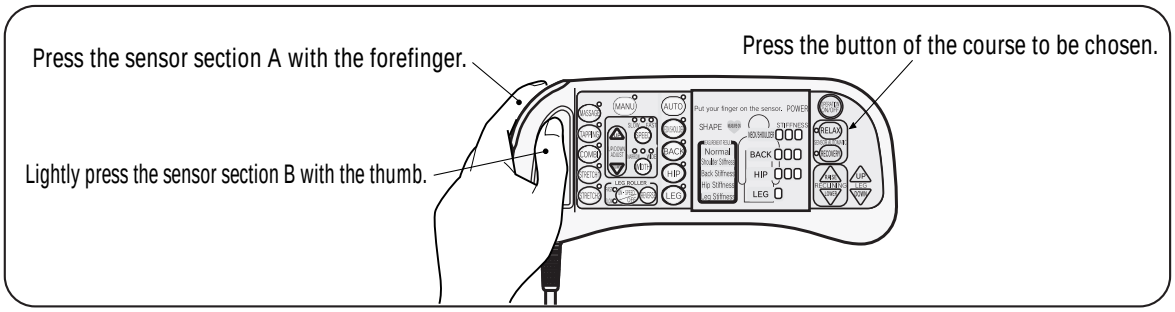
Sensor-automated massage judges stiffness feeling by measuring changes of physiological amounts of perspiration, pulses, skin temperature during detection massage, displays the degree of stiffness feeling in three colors, and carries out massage suited for stiffness feeling.

Method and action of sensor-automated massage

1. Place fingers at two places of sensor section of the remote controller.
2. Press "ON/OFF" operation button.
3. Choose "Relax" or "Recovery from fatigue" and press button.

※ LED lamp of the course chosen is lighted red.

Relax course: (Gently massages in such a manner as to relax the whole body.)
Recovery from fatigue course: (Steadily massages with special emphasis placed on portions with stiffness feeling.)


Press the sensor section A with the forefinger.
Lightly press the sensor section B with the thumb.
Press the button of the course to be chosen.

4. Detection massage begins (about 3 minutes).

Neck/shoulder, back, waist, and legs are tapped, massaged, and tap-massaged, and stiffness feeling is judged in four stages and indicated in three colors
(leg sections are massaged with rollers only).

※If fingers are released from sensor sections during detection massage, no accurate measurement can be made. When accurate judgment is unable to be made, indicator lamps for stiffness feeling judgment do not go on and standard massaging operation takes place.

5. Upon completion of detection massage, a buzzer comes on and massage of the course chosen takes place.
6. Based on stiffness feeling judged in four stages by detection massage, massage suited for stiffness feeling is carried out for about 10minutes by varying speed and time with respect to standard action of each course.

When “Relax” course is chosen:

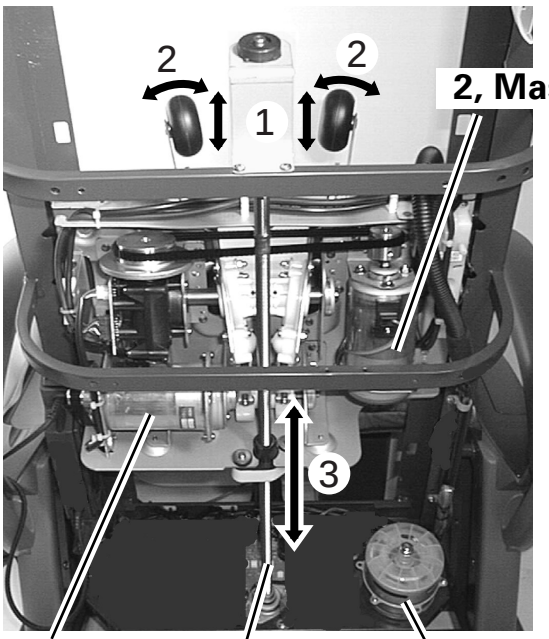
Each massage at portions with stiffness feeling is carried out at slower speed and in shorter time.
Each massage at relaxed portions is carried out at standard speed and in longer time.
In the case of normal portions, each massage takes place at standard speed and time.

When “Recovery from fatigue“ course is chosen:

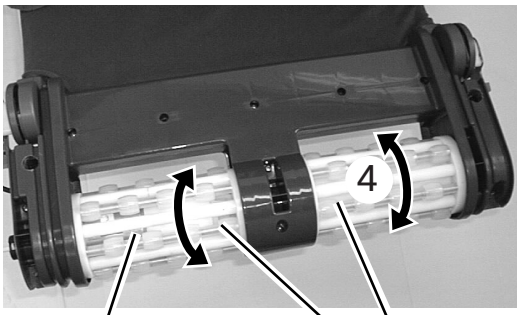
Each massage at portions with stiffness feeling is carried out at standard speed and in longer time.
Each massage at relaxed portions is carried out at faster speed and in shorter time
n the case of normal portions, each massage takes place at standard speed and time.

If "Pains" judgment is obtained by detection massage, massage speed is decreased and time is also decreased for both courses.
(When it is judged that the back aches, massage of the back is omitted.)

※If courses are changed after detection massage, massage is carried out from the very beginning of the course changed.



2, Massage motor



4, Leg massage motor

roller

1, Tapping motor

3, Elevation motor

Screw bar

1, Tapping motor

This motor rotates to move the massage balls upward and downward alternately via the driving belt coupled to the motor.
(The motor revolutions is adjustable in three steps so that the patting frequency can be changed over to approximately 360, 480 and 600 cycles/minute.)

2, Massage motor

This motor rotates to move the massage balls crosswise via the driving belt and gear box coupled to the motor.
(The motor revolutions is adjustable in three steps so that the massaging frequency can be changed over to approximately 20, 25 and 30 cycles/minute.)
(When patting and stretching the backbone line, the massage ball position (ball moving range) can be changed over in three steps after starting the patting motor.)

3, Elevation motor

This motor rotates to transmit its rotating torque to the threaded rod via the driving belt, whereby the massage unit is moved upward and downward.
(This motor rotates clockwise and counterclockwise to thereby move the massage unit upward and downward.)

Tapping-massaging

You can enjoy the good comfort that you can not do by hand tapping-massage, by starting both the tapping motor and the massage motor simultaneously.

I-shaped tapping - Z-shaped massaging

Massaging same portion can be prevented by moving minutely the massage balls upward and downward by starting the elevation motor while running the tapping motor for tapping operation or the massage motor for massaging operation.

4, Leg massage motor

The leg motor rotation is transmitted to the outside roller through gear box.
Motor rotating speed is changed over between normal/reverse.
In addition, the rotating speed is adjusted in two stages and changed over to about 100 or 70 revolutions/min.